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ABSTRACT

HyperCard is a general-purpose program for the Macintosh computer that allows multiple ways of viewing and accessing a large body of information. Two ways in which HyperCard can be used as a research tool are illustrated. One way is to organize and analyze qualitative data from observations, interviews, surveys, and other documents. The other way is to facilitate note-taking for a literature review. A program, "The Data Collector," was developed for research use. It consists of two HyperCard stacks. The first, the Data Collector, organizes and analyzes textual data. The second, BiblioStack, is used for developing bibliographic citations and accompanying notes. A taxonomy of qualitative analysis needs is given. Features of both programs are described, and some ideas are given for further enhancing the program. Three figures illustrate data cards and bibliographic notes. (SLD)

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HyperCard as a Text Analysis Tool for the Qualitative Researcher

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HyperCard as a Text Analysis Tool for the Qualitative Researcher

Computer technology has become an integral part of the research process. Researchers using both qualitative and quantitative data are concerned with the ways in which information can best be organized, analyzed and shared. Software tools for analyzing quantitative data have been widely available since the earliest days of computers, but software that assists with the qualitative analysis of textual data is relatively new.

Word processors and data base programs have been used in the collection and organization of textual data for some time (Pfaffenberger, 1988). They continue to be useful tools for transcribing notes, for finding words in context, for creating indexes, and for organizing and sorting categorical data. More specific text analysis programs, such as *The Ethnograph*, *TAP (Text Analysis Package)*, and *HyperQual* provide systematic ways of collating and comparing material from large bodies of text (Tesch, 1990). However, some of these programs assume the researcher has a well-developed coding schema prior to the analysis rather than allowing the coding categories to emerge during the examination of the data (Wellman & Sim, 1990).

HyperCard is a general-purpose program for the Macintosh that allows multiple ways of viewing and accessing a large body of information. Fetterman (1989) predicts HyperCard "may revolutionize the analysis and presentation of ethnographic work" because it links information from a wide variety of formats and media (p. 79). Users can find and sort information about a specific item much as with a traditional data base program. But HyperCard goes beyond traditional sequential data base programs by allowing users to create links. Any item of information can be linked to any other item of information, creating a web of related ideas. In addition, HyperCard is particularly efficient in handling a large volume of text. Thus, it seemed to us an ideal environment for organizing and analyzing qualitative data.

Objectives

In this paper we illustrate two ways in which HyperCard can be used as a research tool: a) to organize and analyze qualitative data obtained from observations, interviews, surveys and other documents, and b) to facilitate note-taking for a literature review. We have developed a program, *The Data Collector*, for our own research and have recently made it available to others through Intellimation. *The Data Collector* consists of two HyperCard stacks which may be used together or independently. The first stack, called Data Collector, is designed for organizing and analyzing textual data. The second component, the BiblioStack, is used for developing a collection of bibliographic citations and accompanying notes.

This paper describes a taxonomy of qualitative analysis needs, discusses the basic assumptions underlying our program's development, describes the features of both the Data Collector and the BiblioStack, and concludes with our ideas for further enhancing the program.

Taxonomy of Qualitative Analysis Needs

Researchers have different perspectives and thus different analysis needs. Tesch (1991) describes a variety of analytic approaches that qualitative researchers use depending on the purpose of their research. She classifies qualitative researchers into three broad strands: those who are language oriented, those who take a descriptive/interpretative approach, and those interested in theory building.

1. Language oriented researchers are interested in the usage of language and the meaning of words. Their analysis techniques include, among others, the analysis of the content of texts and the analysis of verbal interactions.
2. Those using the descriptive/interpretative approach describe in detail the characteristics and structure of a phenomenon or propose an interpretation of the phenomenon from the point of

view of those who experience it. Their purpose is to gain insight into the situation being studied and to describe it systematically.

3. Researchers using theory-building approaches seek explanations as well as connections. They try to find out *why* as well as *what*.

Although the three approaches share common analysis needs, software developed for qualitative analysis is usually specific to one particular approach (Tesch, 1991). Software for language-oriented researchers must do complex Boolean searches to locate individual words or phrases, count the frequency of words, and create indexes and key word concordances. Software for those using the descriptive/interpretative approach must be capable of assigning codes (representing conceptual categories) to chunks of text. Software to facilitate theory-building should be able to find connections among conceptual categories to determine if the phenomenon under study has a discernible structure. Software in this latter category is modelled on sophisticated expert systems and is still under development (Pfaffenberger, 1988; Tesch, 1991).

The *Data Collector* software is consistent with the descriptive/interpretative approach. Although it can also do complex Boolean searches and count the frequency of search terms, it is designed primarily for researchers who "chunk and code" in order to look for patterns and identify themes.

Basic Assumptions Underlying the Program Design

In designing the *Data Collector* we made a number of assumptions related to computer-aided qualitative data analysis. Our most fundamental assumption, of course, is that using computer software to analyze textual data is easier and more efficient than using a word processor, photocopy machine, colored markers, scissors, and tape. Certainly, word processors with search and replace functions, electronic cut and paste capability, a word count feature, and automatic indexing are useful tools for the qualitative researcher. However, software designed specifically as a tool for qualitative research goes beyond these generic features in order to simplify the task of

assigning codes to chunks of data, assembling the chunks that go together and thus reduce the volume of words into smaller, more manageable units.

The basic assumptions underlying our design of the *Data Collector* derive from our own experiences as researchers, from widely accepted qualitative methods that apply whether or not technology is used (Bogdan & Biklen, 1982; Goetz & LeCompte, 1984; Miles & Huberman, 1984), and from suggestions for evaluating qualitative analysis software as identified by other researchers (Fielding & Lee, 1991; Shermis, Stemmer, Berger & Anderson, 1991; Tesch, 1990,1991; Wellman & Sim, 1990). These are the assumptions that guided our program's development:

- The way we use the software should parallel as closely as possible what we would do without the technology. That is, the design, terminology and features of the software should seem intuitive to the users. As an example, entering and editing text should work like common word processors.
- The software should be flexible enough to accommodate different forms of textual data (interviews, observations, diaries, documents, open-ended surveys, minutes of meetings, and so forth) as well as the various needs of different researchers. Miles and Huberman (1984) suggest that researchers summarize documents such as newspaper articles and curriculum guides. The summaries can then be entered as part of the data and themselves coded.
- The software should be easy to use and forgiving. Researchers do not want to spend a lot of time learning to use the software. They should be able to use the software without having to depend on an expert consultant (Wellman & Sim, 1990). We have tried to anticipate problems by asking "Do-you-really-want-to-do-this?" questions.
- We have not assumed users know anything about HyperCard. In fact, we have removed some standard HyperCard menu items that are not needed and may be confusing. However, the program is not protected, so users who do know HyperCard can add or customize certain features, such as creating different report formats.

- Data collection, reduction, display, and analysis are not separate processes but concurrent and interdependent (Goetz & LeCompte, 1984; Miles & Huberman, 1984). Thus, coding categories will change and develop as the research project continues. Researchers will need to add new code words that emerge during analysis, change existing ones, and delete codes that don't work (Miles & Huberman, 1984; Pfaffenberger, 1988; Wellman & Sim, 1990).
- Data reduction involves a recursive cycle of coding and analysis (Miles & Huberman, 1984). Chunks of data that are coded alike can be copied to a topic card where they can be coded again. The second level of analysis requires a new set of coding categories, which may or may not be subcodes of the main topic.
- When aggregated, coded segments should not be stripped of their context (Miles & Huberman, 1984; Pfaffenberger, 1988; Wellman & Sim, 1990), and they should include information identifying the location of the segment in the original data (Tesch, 1991). To quote Miles and Huberman (1984, p. 54), "Most words are meaningless unless you look backward or forward to *other* words."
- Although Pfaffenberger (1988) and Tesch (1991) recommend that the researcher be able to define the block of text to be coded, we have assumed, for simplicity, the paragraph as the unit of analysis. In other words, codes are assigned to entire paragraphs rather than to segments of text determined by the user. The advantage is that the coding process proceeds quickly with only two clicks of the mouse. If larger blocks are desired, multiple paragraphs can be coded consecutively with only one extra mouse click. The same paragraph may be assigned more than one code word.
- To assist in exploring relationships among concepts, software for textual analysis should be able to do complex Boolean searches involving *and* or *or* (Pfaffenberger,1988; Tesch, 1991; Wellman & Sim, 1990). The search function should be able to search for words or phrases anywhere in the body of the text or specifically for code words.
- Researchers often have important insights while writing up their field notes or coding data. They should be able to enter personal notes and reflections into the body of the text at any time,

but it should be clear that they are not part of the raw data (Bogdan & Biklen, 1982; Miles & Huberman, 1984).

- Often researchers work as part of a team and the software should accommodate collaboration. The researchers should be able to import data from different word processing files. They should be able to save multiple copies of the data, code it independently, and compare the results.
- In order to compare parts of the text that are in different locations, researchers should be able to view two cards simultaneously and copy text from either card to a topic card.
- The researcher should be able to select any subset of the data for printing. The printout should be in a form that facilitates analysis (Wellman & Sim, 1990), presumably double spaced with wide margins.

We have attempted to incorporate features into the Data Collector and the BiblioStack to support these underlying assumptions.

The Data Collector Stack

The Data Collector stack has as its backbone a single card where you can enter any kind of textual data (Figure 1). Data may be typed into a scrolling Notes field or imported into the Notes field from a word processor. In addition to the Notes field, there are fields for the type of data (interview, observation, survey, historical document), general site description, the specific setting, the name of the researcher and the date.

Boolean searching. HyperCard's normal Find function has been enhanced to include Boolean searching using multiple *and's* and *or's*. The Find and Find Again options in the Utilities menu locate all occurrences of a specified word or phrase. The results of the search may be viewed on the screen or copied to a specific topic card created by the researcher.

Coding. The Coding menu allows you to code a document, as well as to add, change or delete code words during the analysis process. First, enter your own code

words. Then you click on a code word in your list and click on the paragraph to be coded. The code word is placed within brackets at the beginning of that paragraph.

Copying text to a topic card. To facilitate the data reduction process and in order to construct themes and domains for further analysis, text may be copied to topic cards, thereby reducing the data to smaller, more manageable divisions for further analysis. To do this, highlight the selected text using the mouse and click the Copy Text button. You choose whether to copy text to an existing topic card or to a newly created topic card. When the text is copied to the card, information identifying the source of the data accompanies it. To continue the data reduction process, the text on the topic cards can be coded and even copied to a new topic card.

Comparative viewing. The Compare Cards button allows you to view two cards on the screen simultaneously. To mark cards for comparative viewing, click on the dotted corner on the card; the corner will turn down. The marked cards are then placed in a separate stack in another window on the screen for easy comparison with the original stack. The ability to compare documents aids in the triangulation process. While in this mode, text from either window may be copied to new or existing topic cards.

Importing and exporting text. The Export and Import items in the Utilities menu provide a means for transferring text files to and from word processing programs.

The BiblioStack

The second component of the *Data Collector* program is the BiblioStack, which facilitates note-taking for a literature review. From the BiblioStack you can create reference cards containing information about a citation along with any number of note cards related to that citation.

Reference cards. The reference card for each bibliographic entry includes standard bibliographic information, a field for key words, and a field for the citation abstract (Figure 2). The complete citation is placed in one field, thus you can enter it using either APA,

Chicago, MLA or any other style. Citations can be directly exported to a word processing program to create a bibliography or list of references. No retyping is needed if the citation has been entered into the BiblioStack using the proper style, although additional formatting may be necessary.

Note cards. Each reference card has associated with it any number of note cards. Each note card contains a field for notes and a field for key words relevant to the particular note (Figure 3).

Boolean searching. You can perform Boolean searches to find any word or phrase in a reference card or note card. The results of the search are viewed on the screen and may be printed out.

Topic stacks. Reference cards meeting a particular search criteria can be marked and copied, with all their note cards, to a new independent topic stack. In this way you can create separate bibliographic stacks for different research projects from your original stack.

Potential Enhancements

This past year we have been using the Data Collector for our own research projects and in teaching the computer component of a doctoral course in Advanced Qualitative Methods. As a result, we are considering enhancements in the program to make it more flexible and useful. We mention these ideas in hope of soliciting feedback and stimulating other suggestions for the program's improvement.

- Allow the user to define the segment of text to be coded rather than assume the paragraph as the unit of analysis. This feature would make the program more flexible but the coding process would take longer because the user would need to highlight each segment of text prior to coding it. Another alternative would be to let the user choose between the two approaches in a Preferences menu.

- Allow the user to define a different set of code words for each topic card. Typically, code words that are defined for a topic card are subcodes of the given topic and thus vary from topic card to topic card.
- Take advantage of the linking capability of HyperCard by providing a way for users to create custom links between specific cards. For example, you may want to link an observation of a student in a writing class with that student's composition. Although experienced HyperCard users would be able to create links now, that feature is not built into the program.
- Allow users to access HyperCard's paint tools to draw diagrams or charts on a data card. For example, notes from a classroom observation may include a student seating chart or a diagram that the teacher drew on the board to explain a concept.
- Give the user the option of an "expert mode" that suppresses redundant dialog boxes. For example, experienced users don't need to be reminded where to click for coding.
- Create a button on the data cards to go directly to the Data Directory in order to facilitate navigation among the data cards.
- Add a Copy Text button to the BiblioStack to copy selected information from the literature review to a topic card in the Data Collector.
- Create topic cards in the BiblioStack based on key words, similar to the topic cards for code words in the Data Collector.
- Provide an optional larger card size so that users can take advantage of the larger screen available on some Macintosh models.

Conclusion

Although originally designed for our own use, we believe *The Data Collector* exemplifies the viability of using technology to meet the needs of researchers doing qualitative analysis. It is important to remember, though, that the software is simply a tool for organizing and managing the data; the researcher must still do the analysis. The

researcher must develop the relevant coding categories, identify emerging themes, and support his or her interpretations from the data. However, software tools such as this one can simply the mechanical aspects of that task considerably. Secondly, we need to remember that qualitative analysis involves a variety of other methods in addition to chunking and coding, such as displaying information in the form of tables, charts, and matrices (Miles and Huberman, 1984). The computer is only one tool among many in the researcher's repertoire.

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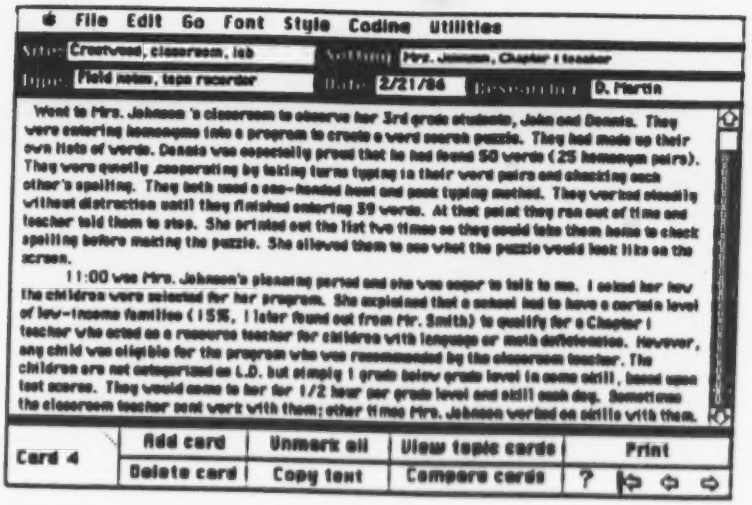
File Edit Go Font Style Coding Utilities
Site: Crestwood, classroom, lab
Setting: Mrs. Johnson, Chapter I teacher
Type: Field notes, tape recorder
Date: 2/21/86
Researcher: D. Martin
Went to Mrs. Johnson 's classroom to observe her 3rd grade students, John and Dennis. They were entering homonyms into a program to create a word search puzzle. They had made up their own lists of words. Dennis was especially proud that he had found 50 words (25 homonym pairs). They were quietly cooperating by taking turns typing in their word pairs and checking each other's spelling. They both used a one-handed hunt and peck typing method. They worked steadily without distraction until they finished entering 39 words. At that point they ran out of time and teacher told them to stop. She printed out the list two times so they could take them home to check spelling before making the puzzle. She allowed them to see what the puzzle would look like on the screen.
11:00 was Mrs. Johnson's planning period and she was eager to talk to me. I asked her how the children were selected for her program. She explained that a school had to have a certain level of low-income families (15%, I later found out from Mr. Smith) to qualify for a Chapter I teacher who acted as a resource teacher for children with language or math deficiencies. However, any child was eligible for the program who was recommended by the classroom teacher. The children are not categorized as L.D. but simply 1 grade below grade level in some skill, based upon test scores. They would come to her for 1/2 hour per grade level and still each day. Sometimes the classroom teacher went work with them; other times Mrs. Johnson worked on skills with them.
Card 4
Add card
Delete card
Unmark all
Copy text
View topic cards
Compare cards
Print
?

Figure 1

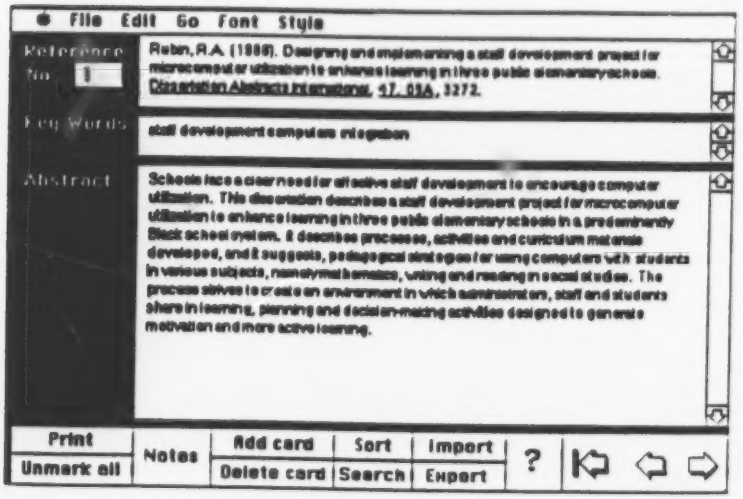
File Edit Go Font Style
Reference No. 1
Rubin, R.A. (1986). Designing and implementing a staff development project for microcomputer utilization to enhance learning in three public elementary schools. Dissertation Abstracts International, 47, 03A, 3272.
Key Words
staff development computers integration
Abstract
Schools face a clear need for effective staff development to encourage computer utilization. This dissertation describes a staff development project for microcomputer utilization to enhance learning in three public elementary schools in a predominantly Black school system. It describes processes, activities and curriculum materials developed, and it suggests, pedagogical strategies for using computers with students in various subjects, namely mathematics, writing and reading in social studies. The process strives to create an environment in which administrators, staff and students share in learning, planning and decision-making activities designed to generate motivation and more active learning.
Print
Unmark all
Notes
Add card
Delete card
Sort
Search
Import
Export
?

Figure 2

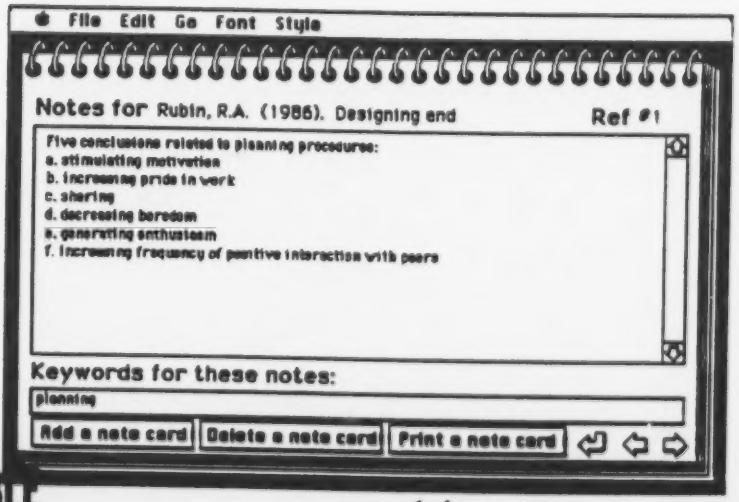
File Edit Go Font Style
Notes for Rubin, R.A. (1986). Designing and
Ref #1
Five conclusions related to planning procedures:
a. stimulating motivation
b. increasing pride in work
c. sharing
d. decreasing boredom
e. generating enthusiasm
f. increasing frequency of positive interaction with peers
Keywords for these notes:
planning
Add a note card
Delete a note card
Print a note card

Figure 3

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